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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,612	06/26/2003	David Tsang	2817P	4908

7590 05/24/2004  
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Palo Alto, CA 94303

EXAMINER

HO, TU TU V

ART UNIT PAPER NUMBER

2818

DATE MAILED: 05/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/606,612

Applicant(s)

TSANG, DAVID

Examiner

Tu-Tu Ho

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-14, 16 and 17 is/are rejected.
- 7) ☒ Claim(s) 7 and 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 06/26/2003
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Oath/Declaration***

1. The oath/declaration filed on 06/26/2003 is acceptable.

### ***Specification***

2. Page 14, line 19, change "word line 226" to "word line 225".

### ***Drawings***

3. Figure 5B is objected to because numeral references 226 and 228 point to the same layer.  
Correction is required.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because:
  - In Figure 3, alphanumerical reference Word Line 83 is not mentioned in the description;
  - bit line 83 is mentioned on Page 8, line 13 and on Page 9, line 9 in the description but not depicted in Figure 3.

### ***Drawing/Claim Objections***

5. The drawings are objected to under 37 CFR 1.81 and 37 CFR 1.83(b) because they are incomplete.

Claims 5 and 13 each recites "the second plurality of write lines being electrically isolated from the magnetic memory element" (wherein the second plurality of write lines reside above the magnetic memory element and wherein at least a portion of the second write line being covered by an insulating layer), which lacks support in the drawings and in the description.

These claims require an illustration by a drawing to facilitate understanding.

### *Claim Rejections*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1, 2, and 10** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hurst et al. U.S. Patent 5,956,267 (the '267 patent).

The '267 patent discloses in Figures 1-16 and respective portions of the specification a magnetic keeper for a word line. Specifically, the '267 patent discloses a memory structure comprising a word line 50 (Figure 5) covered by a magnetic keeper 36/30/38 (Figures 4 and 6), wherein the word line is formed on an integrated circuit, magnetic memory cells (magnetic bit regions) are formed on the word line (WL) (paragraph bridging columns 2 and 3), and then bit lines (BL) are formed (column 1, lines 44-50). However, the reference is completely quiet about the writing or reading capacity of the memory system. Nevertheless, at the time the invention was made, in the MRAM art, read WL, write WL, read/write WL, read BL, write BL, and read/write BL were known. Therefore, it is either that the WL and BL of the memory structure of the '267 are inherently capable of writing or that at the time the invention was made, it would have been obvious to change the WL and BL so that they could write to the memory cells.

Referring to **claim 1**, the '267 patent discloses a magnetic memory cell comprising: a magnetic element 70 ("bit region", Figure 8), the magnetic element being written using a first write line (bit lines) and a second write line 50 (word line), the magnetic element residing at an intersection between the first write line and the second write line (column 1, lines 44-50), the second write line oriented at an angle to the first write line, at least a portion of the second write line 50 being covered by an insulating layer 38 (column 5, lines 26+: "a second barrier layer 38 and a soft magnetic material 30 therebetween. The first and second barrier layers are preferably made from Ta, TiW, TiN, TaN, SiN, SiO<sub>2</sub>, or similar material" (emphasis added)), a magnetic layer 30 covering at least a portion of the insulating layer, the portion of the insulating layer residing between the magnetic layer and the second write line, the magnetic layer including a soft magnetic material.

Note that "covered" and "covering" are being interpreted broadly.

Similarly, regarding **claim 2**, the '267 patent discloses a magnetic memory comprising:

a first plurality of write lines (bit lines);

a second plurality of write lines 50 (word lines) oriented at an angle to the first plurality of write lines, each of the second plurality of write lines having a top and at least one side;

an insulating layer 38 covering at least a portion of each of the second plurality of write lines and a magnetic layer 30 covering a portion of the insulating layer, the portion of the insulating layer residing between the magnetic layer and the second plurality of write lines, the magnetic layer including a soft magnetic material;

a plurality of magnetic memory elements residing at intersections of the first plurality of write lines and the second plurality of write lines.

Referring to **claim 10**, the structure of the '267 patent inherently carries a method of providing or manufacturing as claimed.

7. **Claims 1-6, 8, 10-14, and 16** are rejected under 35 U.S.C. 102(e)(1) as anticipated by Asao U.S. Patent Application Publication 2004/0075125 (the '125 publication).

The '125 publication discloses in Figure 38 of the sixth embodiment, and respective portions of the specification a magnetic memory cell and an inherent method of providing and manufacturing as claimed.

Referring to **claim 1**, the '125 publication discloses a magnetic memory cell comprising:

a magnetic element MTJ<sub>i</sub>, the magnetic element being written using a first write line 20B (read/write WL) and a second write line 24 (read/write BL), the magnetic element residing at an

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intersection between the first write line and the second write line, the second write line oriented at an angle to the first write line, at least a portion of the second write line 24 being covered by an insulating layer 30/31 (“barrier layer”, paragraph [0308]), a magnetic layer 26/32 (“yoke”, paragraph [0306]) covering at least a portion of the insulating layer, the portion of the insulating layer residing between the magnetic layer and the second write line, the magnetic layer including a soft magnetic material (“NiFe”, paragraph [0109] and “high permeability”, paragraph [0306]).

Similarly, regarding **claim 2**, the ‘125 publication discloses a magnetic memory comprising:

- a first plurality of write lines 20B (read/write WL);

- a second plurality of write lines 24 (read/write BL) oriented at an angle to the first plurality of write lines, each of the second plurality of write lines having a top and at least one side;

- an insulating layer 30/31 covering at least a portion of each of the second plurality of write lines and a magnetic layer 26/32 covering a portion of the insulating layer, the portion of the insulating layer residing between the magnetic layer and the second plurality of write lines, the magnetic layer including a soft magnetic material;

- a plurality of magnetic memory elements 23 residing at intersections of the first plurality of write lines and the second plurality of write lines.

Referring to **claim 10**, the structure of the ‘125 publication inherently carries a method of providing and manufacturing as claimed.

Referring to **claims 3 and 11**, the ‘125 publication further discloses that the first plurality of write lines 20B/27x/25xi is a plurality of magnetic write lines (paragraph [0309]).

Referring to **claims 4 and 12**, the '125 publication further discloses that the first plurality of write lines 20B is electrically connected to the plurality of magnetic memory elements MTJ<sub>i</sub>.

Referring to **claims 5 and 13**, the '125 publication further discloses that the first plurality of write lines 20B resides below the plurality of magnetic memory elements, the first plurality of write lines being electrically connected to the plurality of magnetic memory elements; and

wherein the second plurality of write lines 24 resides above the magnetic memory element, the second plurality of write lines being electrically isolated from the magnetic memory element.

Referring to **claims 6 and 14**, the '125 publication further discloses that the insulating layer is formed using a CVD process (paragraph [0227]). Furthermore, the process is considered non-limitation in the product-by-process claim 6.

Referring to **claims 8 and 16**, the '125 publication further discloses that the insulating layer has a thickness of less than one hundred nanometers (paragraphs [0221] and [0225])

8. **Claims 9 and 17** are rejected under 35 U.S.C. §103(a) as being unpatentable over the '125 publication for being obvious.

The '125 publication discloses a magnetic memory cell and a method of providing and manufacturing as claimed and as detailed above including the second plurality of lines 24 and the soft magnetic layer 26/32, but fails to disclose that the thickness of layer 26/32 is less than one half the thickness of line 24. However, the claimed thickness is obvious for at least one of the following two reasons: 1) it is known that common line 24 must be thick enough to carry the required writing current and from Figure 38, although not shown exactly to scale but at least to



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some degree relative thickness of the elements, one of ordinary skill in the art could determine that the thickness of layer 26/32 is about less than one half the thickness of line 24, and 2)

Applicant has not shown in the specification the novelty of the relative thickness of the layers.

### ***Allowable Subject Matter***

9. **Claims 7 and 15** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for the indication of allowable subject matter: The cited art, whether taken singularly or in combination, especially when all limitations are considered within the claimed specific combination, fails to teach or render obvious a magnetic memory cell and a method of providing and manufacturing thereof having all exclusive limitations as recited in claims 1/7 (claim 1 and claim 7) and claims 10/15 characterized in that the second plurality of write lines includes aluminum and in that the insulating layer is oxidized aluminum.

### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

TH

Tu-Tu Ho  
May 13, 2004



David Nelms  
Supervisory Patent Examiner  
Technology Center 2800